

## WHAT IS CLAIMED IS

1. A method of treating a cancer in a mammal, comprising administering to a mammal afflicted with cancer an IL-21 polypeptide, variant, or fragment of either of the foregoing in an amount effective to treat the cancer in the mammal.
2. A method of treating a cancer in a mammal, comprising administering to a mammal afflicted with cancer an IL-21 polynucleotide or fragment thereof in an amount effective to treat the cancer in the mammal.
3. A method of treating a cancer in a mammal, comprising administering to a mammal afflicted with cancer an expression vector containing an IL-21 polynucleotide or a fragment thereof in an amount effective to treat the cancer in the mammal.
4. The method according to claim 3, wherein the expression vector is pORF.
5. The method according to claim 1, 2, 3, or 4, wherein the cancer is a melanoma.
6. The method according to claim 1, 2, 3, or 4, wherein the cancer is a sarcoma.
7. The method according to claim 1, 2, 3, or 4, wherein the cancer is a colon cancer.
8. The method according to claim 1, wherein the IL-21 polypeptide, variant, or fragment of either of the foregoing is co-administered with a vaccine, an antigen-specific T lymphocyte, a cytokine, or a combination thereof.
9. The method according to claim 2, wherein the IL-21 polynucleotide or fragment thereof is co-administered with a vaccine, an antigen-specific T lymphocyte, a cytokine, or a combination thereof.
10. The method according to claim 3, wherein the expression vector is co-administered with a vaccine, an antigen-specific T lymphocyte, a cytokine, or a combination thereof.
11. The method according to claim 8, 9, or 10, wherein the vaccine is a recombinant viral vaccine or a peptide vaccine.

12. The method according to claim 8, 9, or 10, wherein the cytokine is IL-2, IL-7, or IL-15.
13. The method according to claim 8, 9, or 10 wherein the antigen-specific T lymphocyte is a tumor specific T lymphocyte.
14. A method of treating an immune-related disease in a mammal, comprising administering to a mammal afflicted with an immune-related disease an IL-21 polypeptide, variant, or fragment of either of the foregoing, in an amount effective to treat the immune-related disease in the mammal.
15. A method of treating an immune-related disease in a mammal, comprising administering to a mammal afflicted with an immune-related disease an IL-21 polynucleotide or fragment thereof in an amount effective to treat the immune-related disease in the mammal.
16. A method of treating an immune-related disease in a mammal, comprising administering to a mammal afflicted with an immune-related disease an expression vector containing an IL-21 polynucleotide or fragment thereof in an amount effective to treat the immune-related disease in the mammal.
17. The method according to claim 16, wherein the expression vector is pORF.
18. A method of preventing a cancer in a mammal, comprising administering to a mammal an IL-21 polypeptide, variant, or fragment of either of the foregoing in an amount effective to prevent the cancer in the mammal.
19. A method of preventing a cancer in a mammal, comprising administering to a mammal an IL-21 polynucleotide or fragment thereof in an amount effective to prevent the cancer in the mammal.
20. A method of preventing a cancer in a mammal, comprising administering to a mammal an expression vector containing an IL-21 polynucleotide or a fragment thereof in an amount effective to prevent the cancer in the mammal.
21. The method according to claim 20, wherein the expression vector is pORF.

22. The method according to claim 18, 19, 20, or 21, wherein the cancer is a melanoma.
23. The method according to claim 18, 19, 20, or 21, wherein the cancer is a sarcoma.
24. The method according to claim 18, 19, 20, or 21, wherein the cancer is a colon cancer.
25. The method according to claim 18, wherein the IL-21 polypeptide, variant, or fragment of either of the foregoing is co-administered with a vaccine, an antigen-specific T lymphocyte, a cytokine, or a combination thereof.
26. The method according to claim 19, wherein the IL-21 polynucleotide or fragment thereof is co-administered with a vaccine, an antigen-specific T lymphocyte, a cytokine, or a combination thereof.
27. The method according to claim 20, wherein the expression vector is co-administered with a vaccine, an antigen-specific T lymphocyte, a cytokine, or a combination thereof.
28. The method according to claim 25, 26, or 27, wherein the vaccine is a recombinant viral vaccine or a peptide vaccine.
29. The method according to claim 25, 26, or 27, wherein the cytokine is IL-2, IL-7, or IL-15.
30. The method according to claim 25, 26, or 27 wherein the antigen specific T lymphocyte is a tumor-specific T lymphocyte.
31. A pharmaceutical composition comprising an IL-21 polypeptide, variant thereof, or fragment of either of the foregoing, and a pharmaceutically acceptable carrier, diluent, or excipient.
32. A pharmaceutical composition comprising an IL-21 nucleic acid molecule, or fragment thereof, and a pharmaceutically acceptable carrier, diluent, or excipient.

33. The pharmaceutical composition according to claim 31, wherein the IL-21 nucleic acid molecule is constructed into an expression vector.
34. The pharmaceutical composition according to claim 32, wherein the expression vector is pORF.
35. The pharmaceutical composition according to claim 29 or 30 further comprising a vaccine, an antigen-specific T lymphocyte, a cytokine, or a combination thereof.
36. The pharmaceutical composition according to claim 33, wherein the vaccine is a recombinant viral vaccine or a peptide vaccine.
37. The pharmaceutical composition according to claim 33, wherein the cytokine is IL-2, IL-7, or IL-15.
38. The pharmaceutical composition according to claim 33, wherein the antigen-specific T lymphocyte is a tumor-specific T lymphocyte.